

Teardown of the PSVR, the PlayStation virtual reality headset designed by Sony with gaming as its primary function.

[illegible]

INTRODUCTION

We'd say that VR was for startups and übergamers until now, but Sony has been perfecting their headset for *yeeears*. With gaming giant Valve and up-and-comer Oculus already established, can the PlayStation VR measure up? Time to dive into the hardware of this latest PlayStation accessory and see what it's bringing to the fight!

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[video: <https://www.youtube.com/watch?v=ht884XSmMNY>]



TOOLS:

- [iFixit Opening Picks set of 6](#) (1)
 - [Tweezers](#) (1)
 - [64 Bit Driver Kit](#) (1)
JIS 0, or Phillips 000
 - [Spudger](#) (1)
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Step 1 — PlayStation VR Teardown



- On paper, the PlayStation VR stands tall next to its two PC-based competitors, the Oculus Rift and HTC Vive. Here are the specs we're most interested in:
 - Single 5.7-inch AMOLED display with 1920 × 1080 resolution (960 × 1080 per eye)
 - Approximately 100° field of view
 - Refresh rate up to 120 Hz
 - Six-axis inertial measurement system (three-axis gyroscope, three-axis accelerometer)
 - Headset weight: 610 g

Step 2



- The PlayStation VR differs from its competitors with its headband-and-hanging-visor, rather than the (previously standard) goggle configuration.
 - ★ This means way less [goggle-mark "Oculus face."](#)
- The standard PS VR comes with headset, mini-PS4 processor unit, headphones, and several numbered cables to connect it all.
- Sold separately (or included in the bundle edition) are the (very necessary) camera and (optional) PlayStation Move sticks.
 - ★ The Move controllers are tried and true, and we've got a years-old yet still snappy [teardown](#) for your viewing pleasure.

Step 3



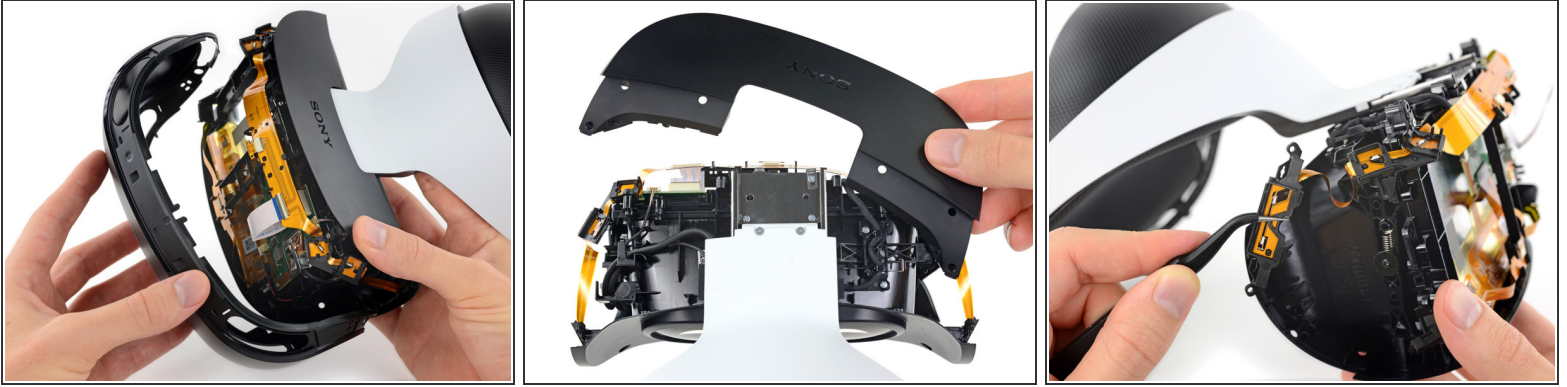
- Time for a brief look at the external bits before we crack the PS VR open.
- Lacking the "strap it to your face" build, the PS VR has a sliding headband (not unlike the [Oculus CV1](#)) with a wheel for fine tightening to ensure a snug fit.
- Sony's unique hanging visor design presents an all-new solution to the problem of adjusting eye relief. Just hold the button (above the cute PlayStation button symbols) and slide the "scope" forward or back to change the focus.
 - ⓘ This is much simpler than the Vive's [complex gear train](#), but not quite as painfree as pushing the Rift up or down on your face (thanks to its [assymetrical Fresnel lenses](#)).
- The PS VR lenses are actually totally conventional, no [Fresnel \(Vive\)](#) or [hybrid-Fresnel \(Rift CV1\)](#) lenses here.

Step 4



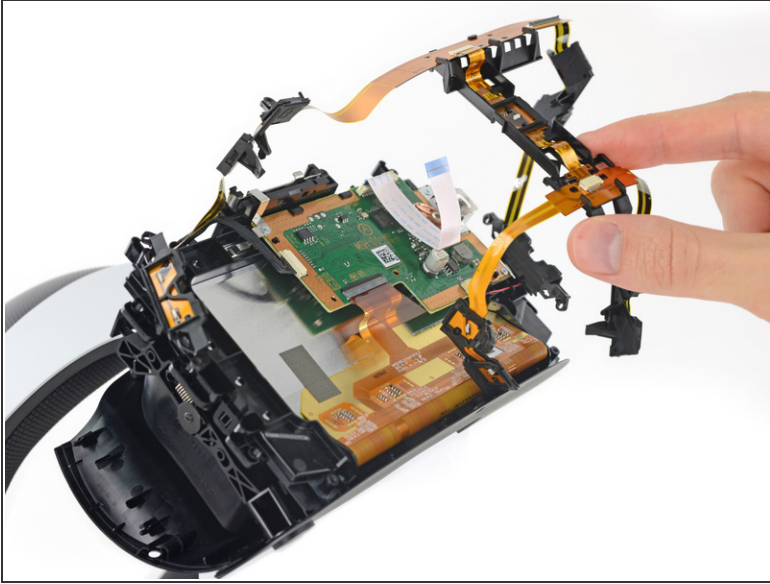
- The scope relies on a rubber mask, rather than goggle foam and a tight fit, to block light. As a bonus, it's probably more washable than foam.
- With the user-replaceable rubber shield peeled away, we're treated to simple JIS screws ([Phillips' pointed-headed cousins](#)) holding the scope together.
- We gleefully pry the futuristic plastic trim (and LED diffusers) away with our trusty [opening pick](#).
 - And peeking out just behind, we've found the first of the 9 position-tracking LEDs. [Soon](#).

Step 5



- Trim bits removed, we're able to detach the front panel of the visor unit to reveal a sea of flex cables and components.
- Pulling off the top panel reveals the metal rail that the visor unit slides on when adjusting eye relief.
- Unlike the Rift and Vive, which rely on invisible IR light for position tracking, the PS VR uses visible light LEDs, in that iconic PlayStation blue.
- We peel up the first of these LEDs, but can't separate them yet—they're part of a larger assembly, containing all 7 of the headset's lights.

Step 6



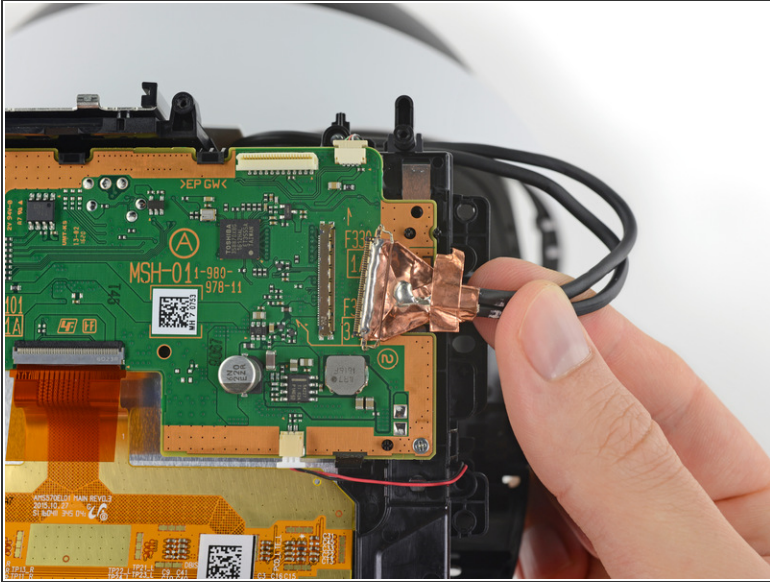
- After teasing the first bit free, we go for gold and take out the entire insectile LED assembly cable.
- Capitalizing on their [existing technology](#), Sony chose to use visible light LEDs and the PlayStation Eye camera for position tracking.
 - ❗ Using visible light means the PS VR will have a harder time competing with ambient light in the room—maybe why Sony doubled up most of the LEDs, increasing the size and brightness of each light on the headset.
- This system is most similar to the [Rift CV1](#), with a pattern of light on the headset scanned by a stationary receiver. The [Vive](#), on the other hand, uses IR receivers on the headset, reading from a pair of stationary emitters.
 - ❗ We also note the relative scarcity of LEDs (15 in total) compared to the more than 40 that make up the Rift's IR LED array.

Step 7



- Remember that slick scope adjustment button a few steps ago? Here's the adjustment it allows—up close and personal! Oooh, springy.
- [Eye relief](#) is the distance between your eye and the plane of the display. A large adjustment range means that users can fit glasses under their headsets with ease.
- ⓘ This might not be as simple an adjustment as the CV1, but it should be [more comfortable for more users](#).

Step 8



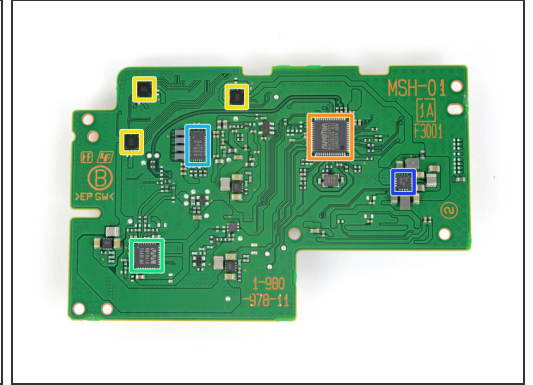
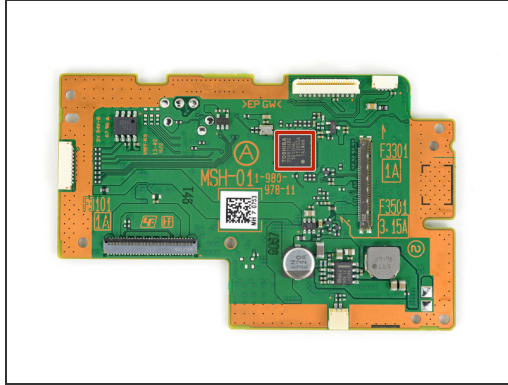
- Two cables remain before we're able to separate the ~~saucer section~~ headband.
- This wide, reinforced connector makes us think [display cable](#)—and we're not too far off, as this is for HDMI-in and an AUX connector.
- ❗ Referred to collectively as the VR headset cable, this tiny package is some of the best cable management we've seen in VR.
- The second cable, a tiny 4-pin job, powers the remaining LEDs, located on the back of the headband.

Step 9



- Tucked away ever so slightly between the lenses we find some hidden electronics.
 - On the one side, a lone IC: Bosch [BMI055](#) IMU
 - On the reverse, what looks like an infrared rangefinder, composed of an emitter and a receiver.
- ❗ This should tell the PS VR if it's on your face or not. It might even be able to tell when you're getting close to putting it on.

Step 10



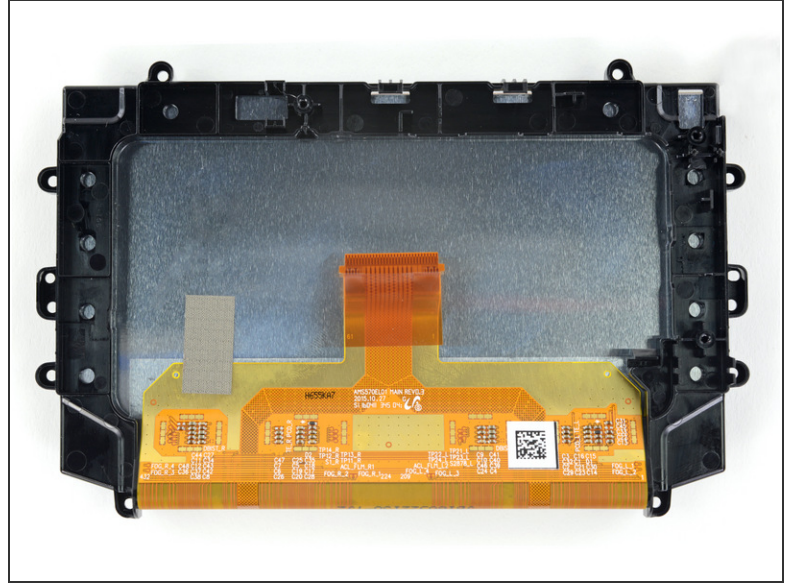
- The motherboard is free from the headset! Here's what we found:
 - Toshiba [TC358870XBG](#) HDMI interface bridge
 - Nuvoton [NUC123SD4SN3](#) NUC123 series ARM [Cortex-M0](#) microcontroller
 - ROHM BD2802 RGB LED driver (x3)
 - Wolfson WM1801G *likely an audio controller, as found in the [DualShock 4 controller](#)*
 - 8203 A3 U8CUC D9JKA 1609
 - Texas Instruments S1L 621 APGH *likely a power supply module for the AMOLED display*

Step 11



- What we thought might be a wee speaker grille is actually for a sizable microphone mounted under the visor.
 - ⓘ Maybe PS VR advises you to take a break if you start breathing too hard?
- The single display is mounted to the lens assembly with a few screws and two clips, quickly unclipped by a spudger.

Step 12



- With the Samsung-manufactured AMOLED display freed, we throw it on the table for a closer look.
- While the [Rift](#) and [Vive](#) utilize two separate displays and some complex IPD (interpupillary distance) adjustment mechanisms, Sony chose to simplify everything with a single display and digital IPD.
- ① That means software will reposition the image on each half of the display. You'll lose some pixels as you increase the distance, but hopefully streamlining the design makes it worth the sacrifice.

Step 13



- Sony's been touting the subpixel matrix in this display, so we decided to whip out our microscope and take a closer look.
 - On the left we have a traditional LED-backlit IPS display from an iPhone 6s.
 - And on the right is PS VR's AMOLED display featuring a hexagonal subpixel matrix, consistent with other Samsung-made OLED displays found in their flagship smartphones.
- ❗ And because we know you can't see those subpixels we've included a magnified view of the OLED panel. Although there is only an 18% increase in pixel density, the pixels on the headset display seem tiny due to its unique subpixel matrix.

Step 14



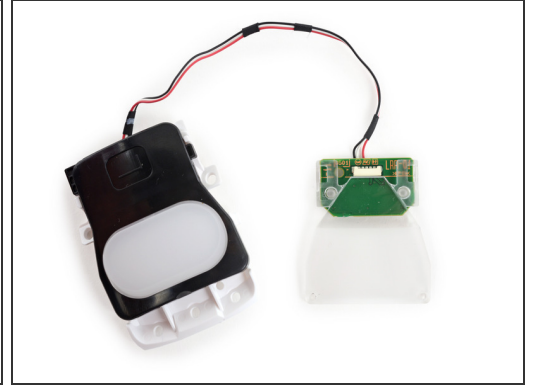
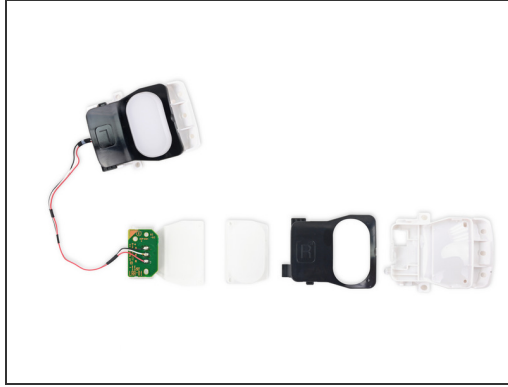
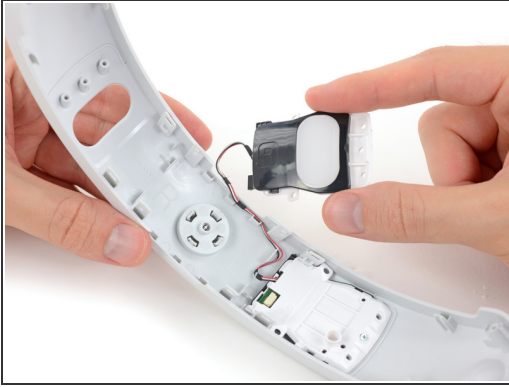
- A soft rubber gasket cushions the display against the lens assembly, and seals dust out of the clean-room optics chamber.
 - The lenses are glued in place in their frame, but with a bit of encouragement (e.g. some heat and a good push) they pop right out.
 - These are 14 mm thick conventional lenses, with no Fresnel stepping, and a smooth dome shape. That means the lenses are quite a bit thicker than the Fresnel lenses in the [Vive](#) and the hybrid Fresnel lenses of the [Rift](#).
- ⓘ While Oculus and HTC chose to shave off some weight with thinner lenses, these coke bottle lenses should scatter less light from the display, and provide a more cohesive image than the optics in the Vive or Rift. Fresnel lenses tend to create optical discontinuities between their steps that can break the image up into chunks.

Step 15



- Time to tackle that headband!
- First up, we pop out the squishy headband cushions. No glue or screws here, so fret not, sweaty friends. The prospect of future cushion swaps look good.
- We have nice little counterweights on either side of the adjustment knob to offset the scope's display and lens mass. There's just a dab of glue and some clips holding them in place, so they're easily scooped out.
- Because these weights are purely for balance, let's take them out and *then* compare across the big three, to see who *could* make the lightest headset. Removing their 95 g puts the PS VR at around 515 g. That puts it right between the Vive's 563 g and the Rift's 470 g.

Step 16



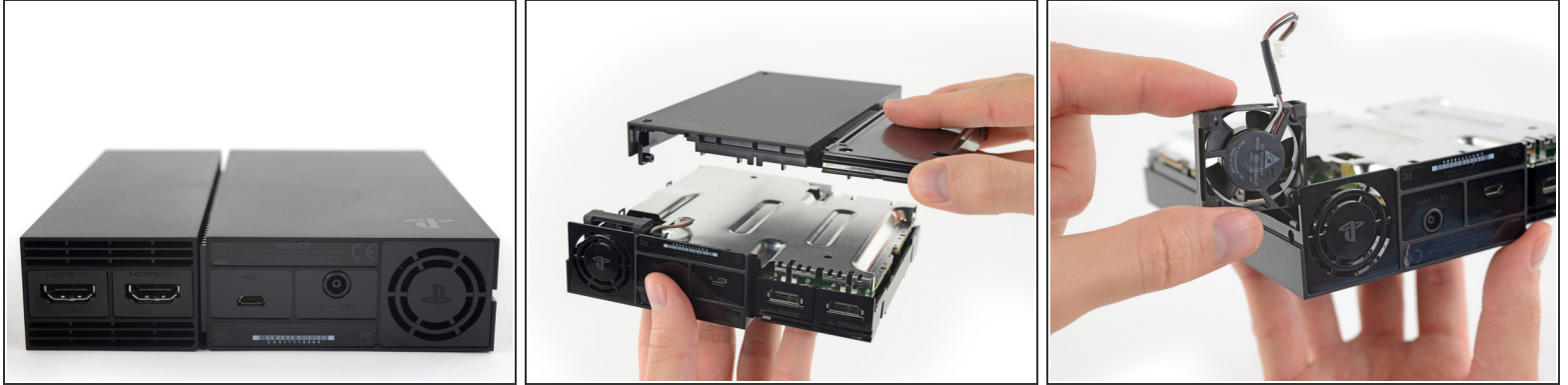
- Last out of the headband, the pair of "back up" lights.
- These are the two LED assemblies that allow the position tracking system to keep an eye on you when you're looking over your shoulder, keeping the in-world feel alive.
- ☑ The assemblies are also conveniently labeled right and left. Labels make a fixer's heart glad.
- ⓘ With a bit less space to spare in the headband than in the visor section, these LEDs light the edge of a light guide before passing through the diffuser.

Step 17



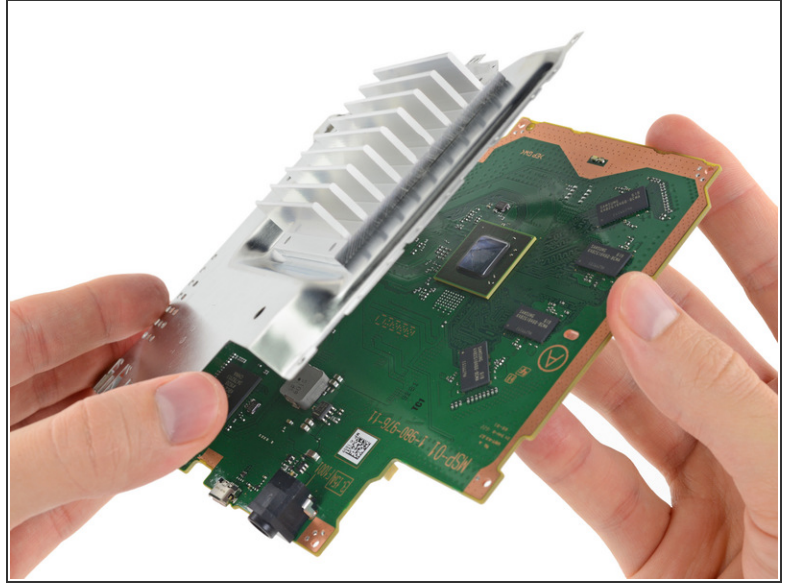
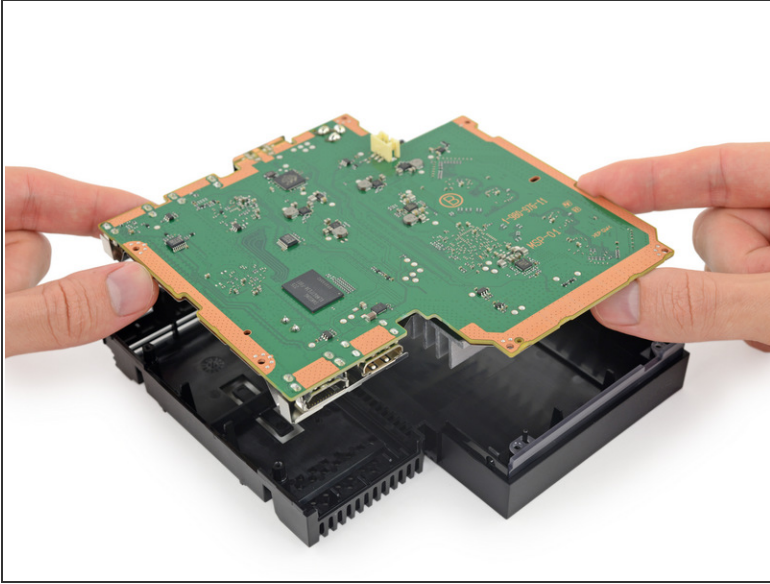
- Before we leave the headband for dead(band), we pop open the band adjustment mechanism.
- A spring-loaded pinion gear assembly rotates against two [racks](#) that spread or contract, tightening or loosening the band.
- A locking mechanism built into the gear assembly prevents the band's adjustment from slipping while you're swinging your head around in the zone.

Step 18



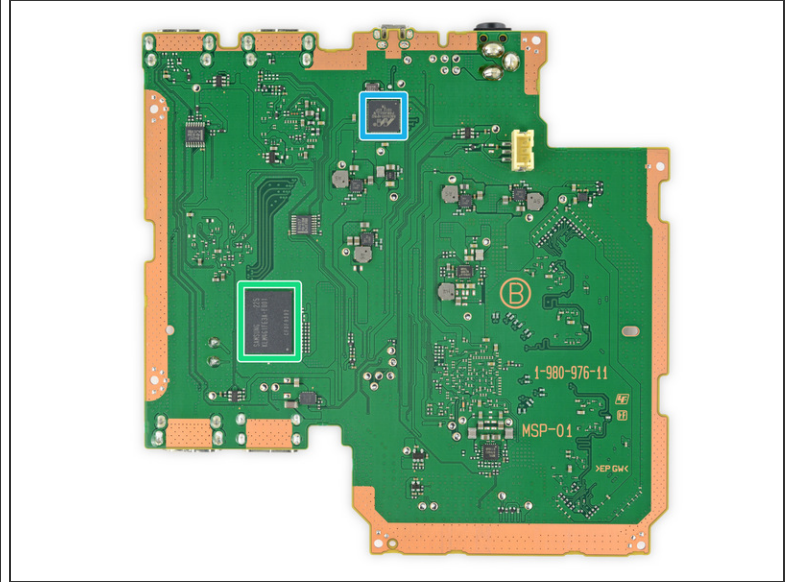
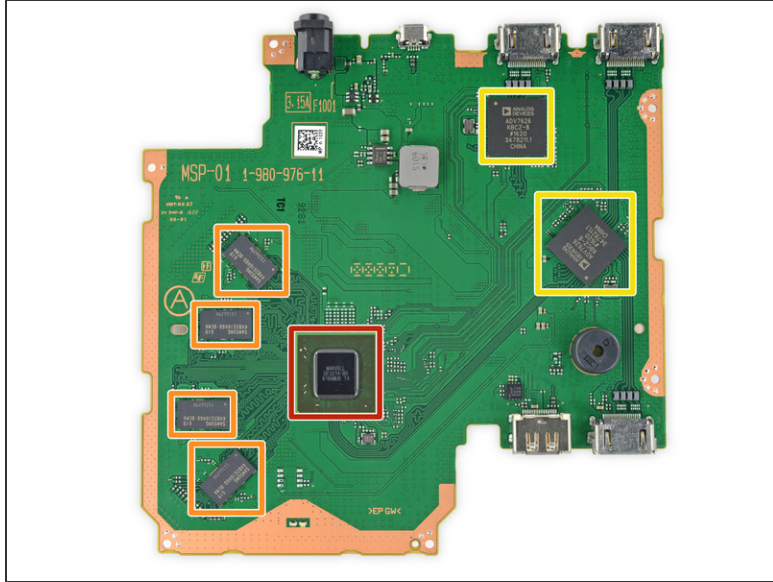
- We move on from the headset to the miniature PlayStation that Sony graciously included with the PS VR at no extra charge.
 - ⓘ ...And our editors have just informed us that this only *looks* like a tiny PlayStation, and is actually a Processor Unit, designed to go between the PS4 you already have, and your shiny new VR headset.
- It comes equipped with three HDMI ports (one for the PS4 to send video to the unit, and two to send video back out to the TV and headset), a USB port, a proprietary AUX socket, and a barrel jack for DC power.
- We crack it open and find the insides are encased in metal. Not helping your case that this isn't actually a [tiny PlayStation](#), guys.
- While we're here, we stumble upon a cute little brushless fan! Definitely something warm going on in here.

Step 19



- We pop the board out of the box and peel a beefy aluminum heat sink from the processor-side of things.
- [According to Sony](#), this box isn't packing any graphics processing chops. Instead, it handles PS VR's 3D audio processing and can simultaneously direct video to your TV and headset.
- We're just itching to see what powers this puppy.

Step 20



- What's inside the box?
 - Marvell [DE3214-B0](#) Armada 1500 Pro 4K SoC
 - Samsung [K4B2G1646Q-BCMA](#) 256 MB DDR3 SDRAM (4 chips for 1 GB total)
 - [ADV7626](#) HDMI 2:2 cross point transceiver (x2)
- On the reverse:
 - Samsung [KLM4G1FE3A-F001](#) 4 GB eMMC flash SSD
 - Marvell 88E8087-NMN2

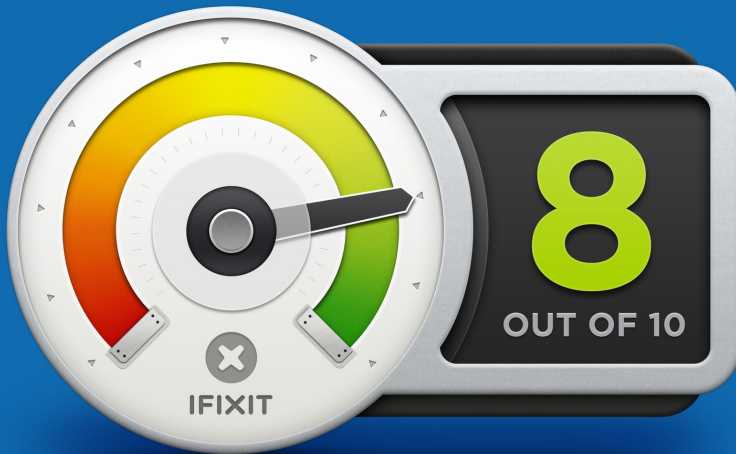
Step 21



- That's how the virtual cookie crumbles!
 - For your dining pleasure we have a deconstructed PS VR headset
 - And for dessert: a PS VR Processor Unit!

Step 22 — Final Thoughts

REPAIRABILITY SCORE:



- The PlayStation VR Repairability Score: **8 out of 10** (10 is best):
 - Thoughtfully constructed and fairly straightforward to disassemble.
 - Many pieces, such as the cushions and light shield, snap in place with no fussy fasteners or adhesive.
 - Standard JIS J0 screws are used throughout. You can take it apart with a single driver that's likely already in your electronics toolkit (Phillips drivers work for JIS in a pinch).
 - Adhesive is mild, used sparingly, and mostly easy to remove. However, the lenses are firmly glued in place.
 - Complicated piece of hardware with a lot of extra trim pieces that would be difficult to reassemble without guides.

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